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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION
ST. CROIX, VIRGIN ISLANDS, U. S. A.
Under the supervision of the
UNITED STATES DEPARTMENT OF AGRICULTURE

REPORT OF THE VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION

1932

Issued April, 1933

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF EXPERIMENT STATIONS

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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION, ST. CROIX

[Under the supervision of the Office of Experiment Stations, United States Department of Agriculture]

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VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION

ST. CROIX, VIRGIN ISLANDS, U. S. A.

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Washington, D. C. April, 1933

REPORT OF THE VIRGIN ISLANDS AGRICULTURAL EXPERIMENT STATION, 1932

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REPORT OF THE DIRECTOR

By Glen Briggs

REVIEW OF WORK, 1919–1932

The group of Virgin Islands formerly known as the Danish West Indies was transferred to the United States by Denmark in March, 1917, and the agricultural experiment station which had been established on St. Croix in 1911 was put under the direct control of the United States Department of Agriculture in January, 1919, at which time it became the Virgin Islands Agricultural Experiment Station. On July 1, 1932, the station was transferred to the United States Department of the Interior.

A survey, made in 1921 by Walter H. Evans, Chief of the Division of Insular Stations, Office of Experiment Stations, showed that the people of St. Croix, the largest and most populous island of the group, were engaged principally in sugarcane growing and in cattle raising; those of St. Thomas, where the land is not adapted to agriculture by the usual methods of tillage, depended entirely on the commerce of the harbor, which was uncertain; and those of St. John raised some cattle and were interested in the production of bay oil which formed

the basis of the bay-rum industry. Agricultural standards generally were low, transition from Danish practices to American ideals was necessarily slow, and the station personnel had to familiarize itself with local soil and climatic conditions and to do much pioneering before undertaking definite intensive experiments.

During the period 1919–1932 the station assembled a competent staff of workers whose efforts are creditably reflected in the development of agricultural industries offering commercial promise to the people as a whole, and in improved conditions that have led to the adoption of modern farming implements and the growing of better crops, fruits, and vegetables. The work of the station has met with the hearty support of the people of the three islands and the generous response of plantation owners, and the findings have been put into practice in other parts of the subtropical world.

Experiments with varieties of sugarcane occupied a prominent place in the work of the station; next in importance was work with cotton, vegetables, and forage crops.

For many years before the American occupation sugarcane had been grown on St. Croix for the manufacture of sugar and rum. However, the relatively dry climate and periods of drought occurring over a number of years had greatly reduced yields and the cane-growing industry was rapidly becoming extinct. Experiments were therefore begun to develop varieties of sugarcane that would be better suited to local conditions than were those previously grown, and to determine the best cultural practices for the crop. Probably the station's outstanding contribution to local agriculture has been the development of the now widely grown and valuable S. C. (St. Croix) 12/4 variety of sugarcane. It has brought millions of dollars to the sugar industry in Puerto Rico, Cuba, and elsewhere, where it is reported to be one of the best varieties for growing without irrigation. Thousands of sugarcane seedlings have been grown and tested for distribution, and many of the progenies of S. C. 12/4 have proved superior in yield and in sucrose content to the parent variety.

Sea-island cotton was introduced into the Virgin Islands from Barbados about 1908, and was profitably grown until the pink bollworm made its appearance. When the station was established the sea-island cotton fields showed a considerable mixture of types having an undesirable habit of growth and abnormal boll dropping. Within three years after the beginning of experiments to correct these conditions, seed of improved cotton was available for local distribution. The station has planted many selections and varieties of sea-island cotton, has reciprocally crossed sea-island and some varieties of upland cotton, and has developed some very productive strains with lint of superior quality. The pink-bollworm situation has been studied with the view of eradicating the pest and thus helping to reestablish the cotton industry.

Before the station was established, limited quantities of such common tropical vegetables as sweetpotatoes, yams, tanias, and okra were grown, and tomatoes and eggplants of inferior quality were the only nontropical vegetables on the market. Now many of the vegetables that grow in the Temperate Zone are successfully grown in the Virgin Islands, and the station work has assisted many members of the poorer classes to supplement their former diet of fish and corn meal with fresh vegetables locally grown. Varieties of tomatoes

and eggplants have been improved; the objectionable color of the Florida butter bean has been eliminated by selective breeding; a promising flinty type of corn has been found; transportation and marketing problems incidental to growing certain crops for winter trade on the northern markets ahve been studied; and shipments of tomatoes, peppers, eggplants, and onions have been made.

Because the sweetpotato is the principal food grown by the natives the station has developed a number of improved seedling varieties. In comparative tests with the Black Rock, the standard local variety introduced from Barbados and used as the check, S. C. (St. Croix) 794 on eight ⅛-acre plats has yielded 28,037 pounds, whereas the Black Rock on an equal adjoining area has yielded 16,526 pounds. The station has shown that the period of use of sweetpotatoes in the Virgin Islands may be extended by storing them at an average temperature of about 96° F. Sweetpotatoes stored at this temperature kept in good condition much longer than those stored in the ordinary way at room temperature. (P. 13.)

Because of an increasing interest in the livestock industry in the Virgin Islands and its potential importance, the growing of dependable, nutritious, drought-resistant, improved pasture grasses and leguminous supplementary feed crops has been stressed. The results of work with legumes have indicated that cowpeas, velvetbeans, jack beans, sunn hemp, and pigeon peas might be profitably used as forage, cover, and green-manure crops. The cowpea has been found to require about 75 days to mature seed and provides an excellent feed for stock; both green and dried cowpeas have been used for human consumption. The velvetbean has returned 7 tons of green forage in 90 days. The jack bean has made a good cover crop, and the sunn hemp has promise as a green-manure and cover crop. The pigeon pea has been found to thrive on a variety of soil types, and has yielded succulent forage when the crop was planted thickly and cut before developing a high fiber content. The station has advocated the planting of legumes on every plantation in the islands to aid in improving the physical condition of the soil and thus to take the place of expensive fertilizers.

The station has studied the habits of growth of approximately 60 kinds of grasses. Of these, guinea grass, Barbados sour grass, and molasses grass have been outstanding in forage value. Barbados sour grass has controlled the spread of the especially aggressive and very obnoxious hurricane grass where pasturing was not practiced. Sudan grass has produced large yields of forage during long, dry seasons when there has been a shortage of other grasses. Napier grass has resisted drought better than any of the other grasses tried and has given high yields.

The sorgos and grain sorghums are another group of forage plants well adapted to the Virgin Islands and produce under conditions of extreme drought when they are badly needed to supplement pastures. The grain sorghums, kafir, feterita, shallu, milo, and Dwarf hegari, have given good yields of both forage and grain. Sumac and Orange sorgos have made good forage crops and have proved drought resistant.

When the United States took over the Virgin Islands practically all the fruit was imported from neighboring islands. The station has

studied tropical-fruit production in order to introduce and develop varieties having better qualities than the fruits grown on the island. Superior types of papayas from Hawaii and from Guam are now rather generally grown. The high-yielding San Blás variety of coconut, introduced from Nevis, British West Indies, has produced nuts of good quality. Other fruits tried have been tangelos, mandarins, limes, lemons, oranges, grapefruits, grapes, figs, pineapples, dates, avocados, bananas, star-apples, and melons.

When the station was established there were few forest trees on the islands, most of them having been cut for building purposes or for making charcoal. The station, working cooperatively with the United States Forest Service, has devised a system of profitably reforesting some of the otherwise unproductive areas. Thousands of trees have been grown for distribution, and experimental and demonstrational windbreaks and forest plantings have been established.

At the time of the American occupation most of the cattle on the islands were descendants from some that had been introduced years ago from French West Africa. Others showed traces of zebu blood. Neither strain produced animals of the best beef type or of the heavy dairy type. The station has encouraged the improvement of the livestock industry by the introduction of purebred sires, and has obtained the nucleus of an improved dairy herd. The dairy situation has been surveyed; sanitary methods of milking and the feeding of a plentiful supply of nutritious grasses and grains high in protein have been encouraged. The station stressed the advisability of keeping the island cattle free from ticks, built for station and general use the first dipping vat, and maintained quarantine for all stock shipped from, or introduced into, the islands. In addition to building the first silo to store feed for periods of drought the station has been instrumental in reorganizing the St. Croix Livestock Association, and in developing the Ayrdale stock farm on St. Thomas.

Agricultural activities extended to St. Thomas and to St. John in 1926 have resulted in the development of improved livestock and the planting of introduced grasses for forage and permanent pastures. Demonstrations have been given in the preservation and marketing of native fruits in order to utilize surplus production and to furnish a supply when fresh fruits are not available. Experiments to determine the varieties of vegetables best adapted to the two smaller islands have resulted in a larger production of locally grown vegetables of improved quality for home consumption and have developed keen interest in boys' and girls' garden clubs and in adult agricultural clubs.

The station has studied the habits, life histories, and methods of attack of the more important insect pests of sugarcane, cotton, and truck crops, and has devised methods of combating the more destructive species.

In 1931 a representative of the Bureau of Chemistry and Soils of the United States Department of Agriculture made the first reconnaissance survey of the soils of the Virgin Islands. The 82 square miles of territory covered was found to include an unusual variety of fertile soils and to have profitable agricultural possibilities.

PROGRESS OF WORK, 1932

PERSONNEL

J. R. Ricks, temporary director of the station from March 1, 1931, to September 30, 1931, was transferred to the Bureau of Animal Industry of the United States Department of Agriculture, and was succeeded by Glen Briggs, formerly of the Oklahoma and Guam stations. Mr. Briggs arrived in the Virgin Islands August 24, 1931.

The horticulturist visited Puerto Rico to study agricultural practices and to collect valuable plant material. He also visited St. Thomas to assist in agricultural work, and St. John to study the possibilities of the bay-oil industry.

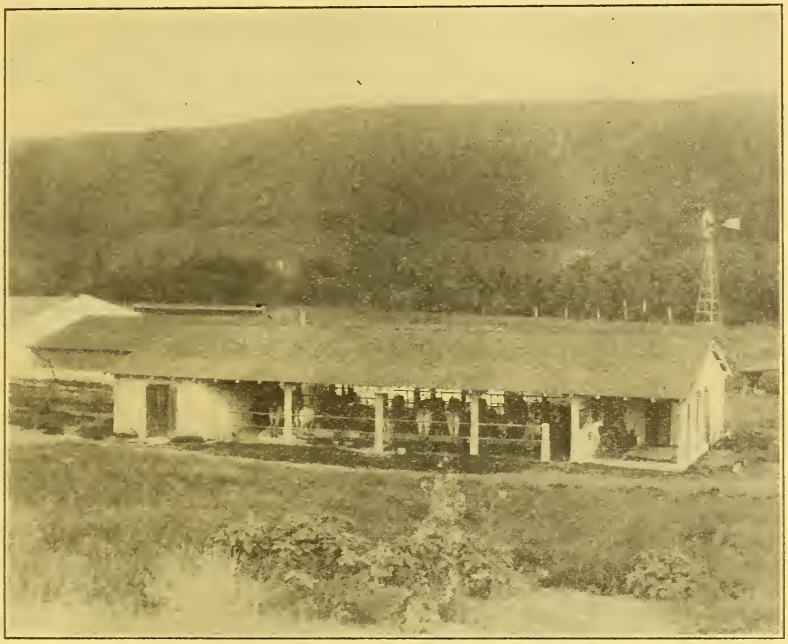

FIGURE 1.—New station dairy barn and creamery

The animal husbandman and veterinarian, in addition to his regular duties, made 890 visits in the performance of his duties as a veterinarian, and traveled 9,664 miles to further the interests of the local animal industry. From July 19 to September 23, 1932, he was absent from the station on leave in the United States. During this period the animal husbandry work was carried on by the associate animal husbandman and dairyman.

In addition to his regular duties, the associate animal husbandman and dairyman traveled over 3,000 miles in St. Croix in the interests of dairy extension activities.

IMPROVEMENTS AND ADDITIONS TO EQUIPMENT

During the year a modern concrete dairy barn with a capacity for 20 cows was completed. (Fig. 1.) Other buildings included a horse

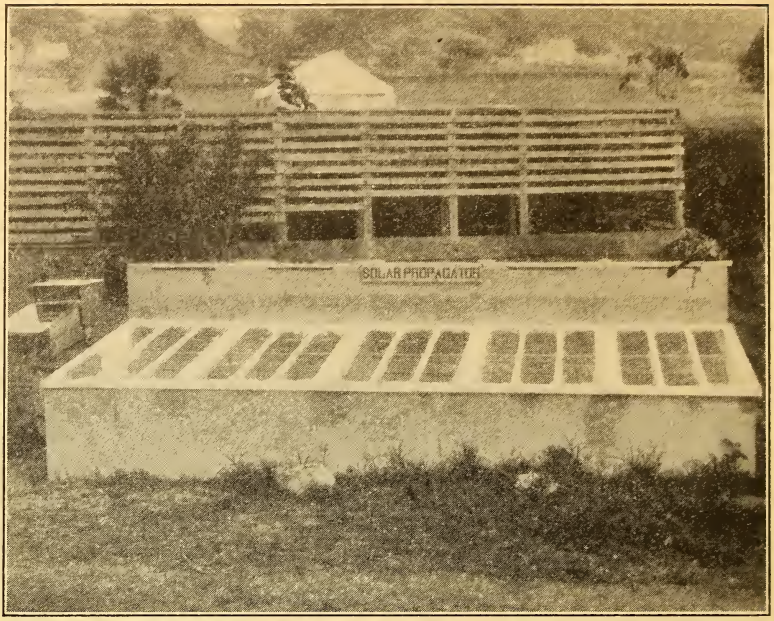

FIGURE 2.—Solar-propagation box

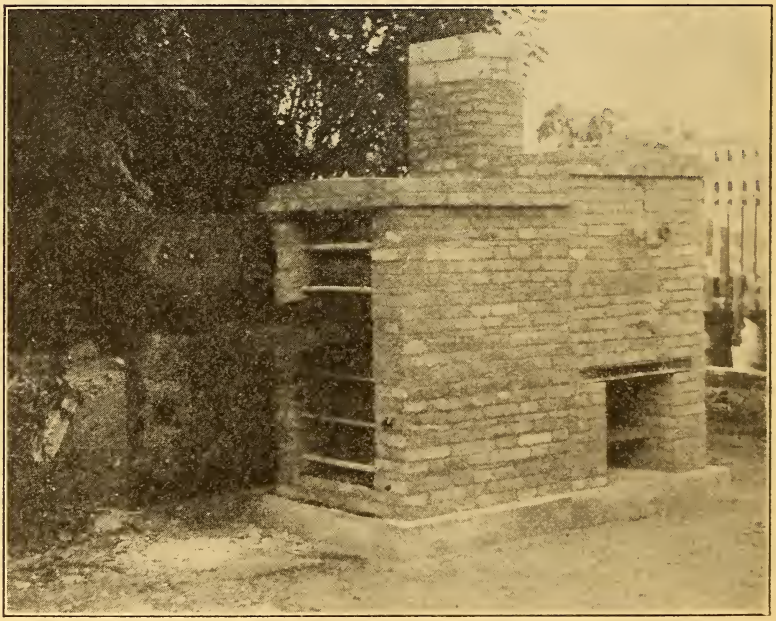

FIGURE 3.—Soil sterilizer, consisting of two connected compartments, one of which contains the furnace. From the furnace a 2-inch vapor pipe enters the second compartment which contains six porous, metal-bottomed trays supported on slides. Each tray holds a layer of soil 4 inches deep. About nine hours of steaming are required to kill the fungi, weed seeds, and grubs

barn, an implement shed, a blacksmith shop, a glass-covered plant-propagation house, complete poultry, brooder, and laying houses, two calf sheds, a sheep shed, and a car shed with a capacity for six automobiles. A solar-propagation box (fig. 2) was constructed to facilitate establishment of cuttings that are difficult to root without bottom heat, and an inexpensive soil sterilizer (fig. 3) was built to kill weed seeds, fungi, and grubs in the soil in the nursery.

The lath-covered propagation house was completely remodeled and rearranged and a water-supply system was installed to distribute both cistern water and well water.

The station devised an economical method of manufacturing concrete plant containers which enables the worker to cast between 50 and 60 pots daily at a cost of slightly less than 5 cents apiece. About 10,000 of the pots are in use at the station.

The old sugar house was remodeled, cement floors, and fumigation, seed, and fertilizer bins were built, and the laboratory was suitably equipped for analytical and other work. Tobacco-curing and corn-drying racks, corn shellers and grinders, cotton gins, a small thresher, and the requisite seed-cleaning machinery were installed for the agronomy department. The station buildings were put in first-class condition. The storage capacity of the water-supply system was increased to 300,000 gallons, with provision for distributing the water to all parts of the central grounds, pastures, and buildings. A well completed in 1931 furnishes sufficient water for emergency and for irrigation. New roads were built and others were graded, repaired, and drained. Part of the station grounds was graded and landscaped. Pasture areas were extended. Mahogany and other kinds of trees were planted along the hillsides near the director's home as a demonstration of the work done by the United States Forest Service. Windbreaks were planted east of the agronomy and horticulture fields.

REPORT OF THE AGRONOMIST

By Glen Briggs

During the first part of the fiscal year the work in agronomy was largely concentrated on the propagation of seed and the preparation of land for planting. Heavy and frequent rains made planting and harvesting difficult. The rainfall of the year was more than ample for crop production and exceeded the average of the five preceding years.

GRASSES AND FORAGE CROPS

Comparative garden tests of grasses were continued. Probably, in part, because exceptionally heavy rains fell during the germinating period, guinea, elephant, Guatemala, Dallis, Para or malojillo, molasses, Barbados sour, Pennisetum, Java, and Bahia grasses made satisfactory growth. Guinea grass is depended on to furnish most of the pasture and cut forage for the station animals. Barbados sour grass furnishes a good pasturage and is particularly valuable under drought. Elephant grass is rather coarse for feeding. Para or malojillo grass has been cut regularly and fed to livestock. Molasses grass grows well in both wet and dry weather.

Results of the cooperative test in control of hurricane grass, begun on the Whim estate in 1930, showed that Barbados sour grass and molasses grass were able to hold their own when planted in strips

alongside the hurricane grass. Guinea, Jaraguá, Bahia, Dallis, Igoka, and a few other grasses grew, but could not spread because the hurricane grass has established itself among their clumps. In a pasture palatability test with horses and mules, the guinea grass was eaten first and the molasses grass next. The animals ate young Jaraguá grass and the tops of Barbados sour grass. They ate hurricane grass in all the plats on which blue wis had become well established and mixed with the grass.

SORGHUMS

Twenty varieties of grain sorghum (fig. 4) under test yielded from 5 to about 42 bushels of grain and from 4 to 11 tons of forage, and 8 varieties of sorgo (sweet sorghum) yielded from 6 to 14 tons of forage and 10 to 43 bushels of grain per acre. Shallu and Blackhull kafir led in grain production; feterita and Dwarf milo led in forage

FIGURE 4.—Grain sorghum, St. Croix station

production. Honey and Sumac, respectively, gave the highest yields of forage. Between 156 and 194 days after planting, Sudan grass in three cuttings from different areas yielded from 11 to 16 tons of green feed per acre.

LEGUMES

Among the legumes tested, Brabham was the highest-yielding variety of cowpea in both forage and grain. Osceola, Mauritius or Bengal, and One-Hundred-Day Speckled velvetbeans made exceptionally good growth and yields. Mauritius in different plantings yielded from 20 to 50 bushels of seed per acre. Several varieties of pigeon pea fruited. Planted at different times during the year the soybean proved to be small, unproductive, and of chlorotic appearance. The plants were attacked by a disease resembling mosaic. Mung beans behaved similarly. Kansas common alfalfa and Peruvian alfalfa came through the severe drought of 1930–31 and the heavy rains of 1931–32, and yielded between 3 and 4 tons per acre.

The work with Crotalarias was devoted largely to multiplying seed for future plantings. Jack beans, planted as a cover crop in the young

coconut grove, failed to shade the ground and to suppress the growth of bay or Bermuda grass. Peanuts did not do well on the heavy type of station soil. *Canavalia maritima* and yam-bean plants produced heavy cover crops throughout the year. Blue wis also again proved its value as a possible cover and a good forage crop.

BROOMCORN

Black Spanish (standard) and dwarf types of broomcorn (fig. 5) were tested with gratifying results. Evergreen (standard) and Scarborough (dwarf) gave good yields, and the brush compared favorably in quality with brush produced in leading broomcorn-growing districts of the United States.

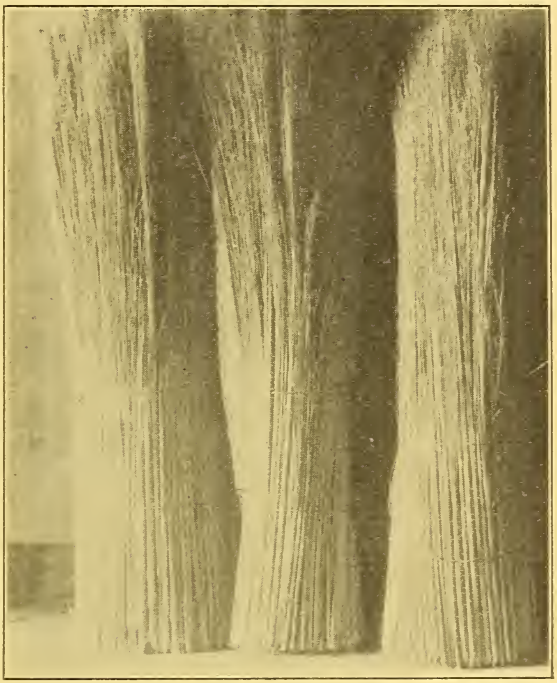

FIGURE 5.—Broomcorn, St. Croix station

COTTON

No experimental work with cotton has been done on St. Croix since the adoption in 1931 of a 2-year closed season to eradicate or greatly reduce the pink-bollworm population. In two clean-up campaigns carried on from August to November, 1930, and from February to June, 1932, all wild cotton plants were grubbed out and burned, and thousands of pounds of seed cotton were destroyed. Most of this cotton was infested with the pink bollworm. Unfortunately the pods of old okra plants in gardens and in sugarcane fields are also hosts of the pink bollworm.

Life-history studies of the pink bollworm showed that the larvae live for about 40 days, the pupae for approximately 20 days, and the moths for an average of 14 days. Eggs, found on young bolls four days after the blossoms had dropped, hatched seven days later.

CORN

Selective breeding of corn was resumed. Selections of native corn, closely resembling selected corn distributed by the station some years ago, yielded from 22 to 45 bushels per acre. Stalk types differed greatly.

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SUGARCANE

The past season was favorable for sugarcane production because the rainfall was above normal during the growing season. The total yield of sugar on St. Croix for the season 1931–32 is estimated at approximately 4,250 short tons.

VARIETIES

Over 100 sugarcane selections and seedlings were planted in May and in June to furnish propagating material of the better selections. Introductions during the year were Mayaguez seedlings 28 and 49 from the Puerto Rico Agricultural Experiment Station, and Co. 281, C. P. 807, P. O. J. 2883, P. O. J. 2722, P. O. J. 2714, and P. O. J. 2727 from the Division of Sugar Plant Investigations of the United States Department of Agriculture. Because of the small plantings in the tests, results are not conclusive, but the Brix hydrometer reading, sucrose content, and purity of juice of a few outstanding selections from introductions or from station seedlings are shown in Table 1.

TABLE 1.—*Record of sugarcane variety test, 1932*

Variety	Brix reading	Sucrose	Purity	Weight per acre	Variety	Brix reading	Sucrose	Purity	Weight per acre
	Degrees	*Per cent*	*Per cent*	*Tons*		*Degrees*	*Per cent*	*Per cent*	*Tons*
S. C. 26/128	23.2	21.77	93.83	32.74	Uba 1241	19.0	16.75	88.16	30.98
S. C. 26/157	23.0	22.00	95.65	23.68	S. C. 26/150	18.8	16.54	87.97	19.82
Crystallina	22.1	21.05	95.20	26.38	P. O. J. 213	18.7	16.67	89.15	44.19
S. C. 26/175	22.1	20.95	94.80	25.35	S. C. 26/85	18.3	16.16	88.30	5.88
S. C. 26/158	24.0	22.85	95.21	22.88	Uba 909	18.9	17.58	93.01	41.41
S. C. 27/94	22.2	20.20	90.99	20.57	S. C. 26/81	20.0	18.02	90.10	30.56
S. C. 26/161	22.0	20.47	93.00	28.40	S. C. 26/102	19.9	18.11	91.00	28.92
S. C. 26/166	19.9	18.42	92.56	26.20	S. C. 26/171	19.4	17.06	87.94	12.72
S. C. 26/8	20.2	18.49	91.53	26.97	P. O. J. 2878	18.2	15.85	87.09	27.29
S. C. 26/1	21.3	20.56	91.83	27.71	S. C. 26/112	20.4	18.69	91.62	10.53
S. C. 12/4	20.5	18.56	90.53	23.55	S. C. 26/128	23.2	21.77	93.83	24.99
S. C. 27/43	20.8	18.74	90.10	17.28	S. C. 28/1	21.5	19.22	89.40	38.94
S. C. 27/47	22.2	20.66	93.06	23.08	S. C. 28/12	20.4	17.69	86.71	7.89
S. C. 27/16	21.6	19.69	91.15	29.31	S. C. 28/3	19.5	17.18	88.10	(1)
S. C. 27/49	21.0	19.49	92.62	25.52	S. C. 28/6	19.0	15.94	83.94	49.67
S. C. 27/32	20.8	18.54	89.13	21.05	S. C. 28/65	21.4	18.88	88.22	64.35
S. C. 27/52	19.4	16.79	86.55	43.19	S. C. 28/72	17.4	13.61	78.21	29.70
S. C. 27/53	19.7	18.09	91.37	36.46	S. C. 28/101	20.0	19.44	97.20	70.08
S. C. 27/75	21.7	20.10	92.63	13.83	S. C. 28/100	19.4	16.82	86.64	10.03
S. C. 27/67	18.8	16.75	89.10	(1)	S. C. 27/186	19.6	17.06	87.04	17.60
S. C. 27/72	19.5	17.51	89.80	21.11	S. C. 28/39	20.6	18.30	88.83	25.34
S. C. 27/80	19.5	17.13	87.84	14.22	S. C. 28/50	20.3	18.01	88.71	32.24
S. C. 27/66	20.7	19.22	92.85	34.13	S. C. 28/87	19.7	17.80	90.36	28.87
S. C. 27/71	19.1	17.33	90.73	23.26	S. C. 28/54	17.3	15.20	87.86	34.11
S. C. 27/93	19.1	17.13	89.68	9.40	S. C. 28/77	18.9	14.50	76.72	9.65
S. C. 27/90	19.9	18.40	92.46	26.11	P. O. J. 36M	21.0	19.26	91.71	23.70
S. C. 27/101	20.2	18.34	90.79	7.49	P. O. J. 36 U. S	20.5	18.35	89.51	33.83
S. C. 27/110	19.6	17.73	90.46	25.59	P. O. J. 826	18.0	15.50	86.11	25.36
P. O. J. 2725	21.0	18.98	93.71	(2)	S. C. 26/90	17.7	15.10	85.31	11.36
S. C. 26/134	21.8	20.35	93.35	(2)	S. C. 30/1	20.9	18.52	88.60	28.63
S. C. 27/120	19.4	15.68	80.82	19.07	S. C. 30/2	21.8	19.66	90.01	41.24
S. C. 26/53	19.1	16.96	88.80	12.54	S. C. 30/3	21.3	18.63	87.46	34.54
Uba 797	19.0	17.89	87.38	39.45	S. C. 30/4	19.8	17.97	90.76	37.45
S. C. 12/4	20.5	18.56	90.53	28.18	S. C. 30/5	17.0	14.54	85.35	48.81
P. O. J. 234	18.0	15.97	88.72	34.31	S. C. 30/6	20.7	17.87	86.33	20.23
S. C. 26/97	18.4	16.64	90.43	44.77	S. C. 30/7	17.2	14.51	84.36	21.67
S. C. 26/115	18.2	16.57	91.04	18.98	S. C. 30/8	20.1	17.26	85.87	20.23
S. C. 26/156				7.88	S. C. 30/9	20.1	19.04	90.47	19.97
S. C. 26/75	19.9	17.99	90.40	11.70	S. C. 30/10	20.1	18.05	90.00	26.72
S. C. 26/81	20.0	18.02	90.10	30.56	S. C. 30/11	19.3	16.89	87.51	36.49
S. C. 26/102	19.9	18.11	91.00	9.88	S. C. 30/12	19.5	16.98	87.07	34.05
P. O. J. 234	18.0	15.97	88.72	30.80	S. C. 30/13	19.6	17.54	89.50	29.53
Uba 797	19.0	17.39	87.38	34.33	S. C. 30/14	22.2	19.84	90.00	19.99
S. C. 26/151	21.4	20.04	93.64	23.97	S. C. 30/15	21.2	19.18	90.47	21.87
S. C. 26/198	21.6	19.88	92.03	28.54	S. C. 30/16	21.4	18.46	86.26	37.64
S. C. 26/41	20.4	18.02	88.33	33.54	S. C. 30/17	21.5	19.31	90.00	16.54
P. O. J. 2379	21.8	19.74	90.55	45.28	S. C. 30/18	22.9	20.78	90.74	25.77
P. O. J. 228	20.3	17.37	85.56	30.62	S. C. 30/19	18.9	16.32	86.32	11.90
S. C. 26/70	21.0	18.64	88.76	14.77	S. C. 30/20	21.1	19.46	92.23	23.91
S. C. 26/72	21.3	19.32	90.70	14.52	S. C. 30/21	19.5	17.27	88.56	13.72
P. O. J. 979	20.6	18.26	88.64	29.19	S. C. 30/22	18.6	15.53	83.50	16.10

[1] Record lost.

[2] All used for plant tops.

As many varieties of sugarcane as could be found growing on St. Croix were collected and planted at the station. One of them—a large, quick-growing, high-yielding cane, discovered on the cane lands of some small farmers and locally called "Mongolian"—appeared promising and was rather extensively planted at the station in a cooperative test. One hundred and twenty-eight varieties or strains were secured for further trial, multiplication plats of outstanding canes were begun, and the sugarcane area was increased from 1 to 15 acres.

SEEDLINGS

Sugarcane arrowed very sparingly in the season of 1931–32, and that which did produce seed apparently was nearly sterile. From over 100 flats planted at different times with "fuzz," only about 50 seedlings made good growth. The work with 1926–1930 selections was continued, the seedlings being planted in increase plats for further selection.

TOBACCO

Of eight varieties of tobacco under test, those grown under cheesecloth for partial shade developed and matured more rapidly, and yielded fully three times as many first-grade leaves as did the tobacco grown in the open. Virginia 1 and Utuado 1, a filler type, gave the largest yields both under partial shade and in the sun.

REPORT OF THE HORTICULTURIST

By Claud L. Horn

INTRODUCTION AND DISTRIBUTION OF ECONOMIC PLANTS

Approximately 4,000 plants have been received for trial at the station since 1922. Many of them have already indicated their value for the islands. During the year a number of valuable and interesting introductions, including some palms, were received for trial and distribution.

A total of 81,679 plants were distributed, including 76,800 fruit (largely limes), nut, and vegetable plants, 721 forest-tree seedlings, and 4,158 ornamentals. The Forest Service distributed many thousands of forest-tree seedlings throughout the islands.

NUTS AND FRUITS

COCONUTS

In February 107 seedlings of the San Blás variety of coconut were planted in the coconut grove, which was started in 1916. This grove now contains 428 palms. In February, 148 palms were planted in a new grove adjoining the old one. A cover crop of jack beans was planted in the new grove.

CASHEW NUTS

The cashew-nut tree is estimated to yield annually from 15 to 25 pounds of shelled nuts. A random sample of 15 pounds of nuts yielded 5 pounds, or 33⅓ per cent, of kernels.

PLANTAINS AND BANANAS

An experimental planting of plantains and of Cavendish and other varieties of bananas was made to serve as a temporary windbreak for

future fruit plantings, a fertilizer experiment, a means of studying banana and plantain varieties, and a source of planting stock for the islands.

PINEAPPLES AND PAPAYAS

In another effort to establish pineapples on the calcareous soil of the station the plants were sprayed regularly with an iron sulphate solution, and in addition one plat was fertilized with inoculated sulphur. Ten months later no roots had formed.

The Long and the Solo varieties of papaya from Hawaii were loaded with full-sized fruit, none of which had ripened at the close of the year.

TRUCK CROPS

BEANS

Two plantings of 35 varieties of bush and pole beans, made to determine which were best adapted to dried-bean production in the

FIGURE 6.—Paragon variety of watermelons, St. Croix station

islands, were affected by mosaic disease. The Limas were less severely attacked than were the common, or kidney-bean varieties, but all the yields were so small as to defeat the purpose of planting. Among the varieties tried, a white selection of the Florida butter bean was the least affected by mosaic.

The white strain of the black-mottled Florida butter bean, selected at the station in 1925, was planted in increase plats to obtain a considerable quantity of seed for general planting in the islands.

WATERMELONS

A good crop of watermelons was obtained. Two plats each were devoted to the wilt-resistant varieties Iowa King, Iowa Belle, and Pride of Muscatine, and to the varieties Tom Watson, and Paragon. (Fig. 6.) In the order of susceptibility to an unidentified disease

that gradually kills the vines from the tips back, the varieties were Tom Watson, Iowa Belle, Iowa King, Pride of Muscatine, and Paragon.

OKRA

Okra, planted on 1½ acres for seed production, yielded 162 pounds of seed for distribution to gardeners on St. Croix, where a campaign to eradicate the pink bollworm is under way. Okra as well as cotton is a host plant of the pink bollworm.

BERMUDA ONIONS

A 0.57-acre plat, planted to the Yellow Bermuda variety of onion, yielded 2,138 pounds of onions, 29 per cent of which were marketable. A large proportion of the crop consisted of splits or doubles.

SWEETPOTATOES

Three varieties of sweetpotatoes planted on banks and on flat land showed little difference in yield. On 0.2-acre plats the variety S. C. 794 yielded 4.8 per cent, and Black Rock, 11.7 per cent, more on banked land than on level land, whereas variety S. C. 749 yielded 4.2 per cent more on flat land.

Further storage experiments showed that sweetpotatoes may be satisfactorily kept for six consecutive months in a room having a galvanized-iron roof and sides and some ventilation. It was found that a higher temperature may be maintained in the storage room if the roof of the building is painted black. This type of storage obviously can be used more satisfactorily for storing sweetpotatoes than can an artificially heated room. To secure the maximum circulation of air the roots should be stored in crates or in small bins.

TOMATOES

A small lot of seed of a tomato variety collected in the Baleric Islands by the Bureau of Plant Industry of the United States Department of Agriculture, was planted at the station. The variety has the desirable characteristic of not dropping the ripe fruits through the formation of abscission layers, as do other varieties. Three plants grown to maturity bore heavily, producing four to seven fruits in a cluster. Seed was saved for planting by the native gardeners who, on account of periods of drought, can not have fresh tomatoes the year around.

TANIAS AND CASSAVA

Tanias yielded at the acre rate of 2,760 pounds, cassava at the acre rate of 1,300 pounds.

HEDGES, WINDBREAKS, AND TREE PLANTINGS

Observations on various hedge plants were continued, plantings during the year including the West Indian cherry (*Malpighia punicifolia*), a single red-flowering hibiscus, horsetail-tree (*Casuarina equisetifolia*), *Tamarix articulata*, the Crimson Lake variety of bougainvillea, skyflower or pigeon berry (*Duranta repens*), croton (*Phyllaurea variegata*), orange-jasmine (*Chalcas exotica*), *Ligustrum nepalense*, *L. quihoui*, blackbead or "bread and cheese" (*Pithecolobium*

unguis-cati), oleander (*Nerium oleander*), mesquite (*Prosopis juliflora*), and painted copperleaf (*Acalypha wilkesiana*).

In cooperation with the Forest Service two windbreaks, with the plants set 7 feet apart in three rows 7 feet apart, were planted on north-south lines on the cultivated land of the station. Solid sections were planted with *Cassia siamea* and with horsetail-tree (*Casuarina equisetifolia*).

As a forestry demonstration and a step in beautifying the station, plantings of *Albizzia procera*, West Indian mahogany, *Guarea guara*, *Ocotea* sp., *Peltophorum domingense*, and *Pterocarpus indicus* were made along hillsides about the director's house in cooperation with the Forest Service.

ARBORETUM

The arboretum is on some of the poorest land of the station and for this reason can not be expected to make optimum plant growth. New species are added from year to year as they become available.

INSECTICIDAL PLANTS

PYRETHRUM

From pyrethrum (*Chrysanthemum cinerariaefolium*) seed received from the Bureau of Plant Industry, a large number of seedlings were planted on poor hillside area and on good land with and without irrigation. All plants failing to receive water died. Those under sprinkler irrigation grew well for some time after the rains ceased, but although they have been irrigated regularly they are in poor condition, probably because of the high salt content of the irrigation water. A few plants tried on St. Thomas died when not irrigated.

CUBÉ

Root cuttings of cubé (*Lonchocarpus nicou*), received for trial from the Bureau of Plant Industry and from the British Guiana Department of Agriculture, had begun to send out roots at the end of the year.

DERRIS

From a few seeds of derris (*Deguelia* (*Derris*) *elliptica*), received for trial from the "'slands Plantentium," Buitenzorg, Java, vines 6 feet long had developed by the end of the year.

REPORT OF THE ANIMAL HUSBANDMAN AND VETERINARIAN

By G. A. Roberts

Timely rains resulted in the production of an abundance of pasturage during the greater part of the year. However, during March and April pasturage was supplemented with some soiling crops, principally sorghum and Sudan grass.

THE STATION HERD

At the close of the year ended June 30, 1932, the station had 5 mules, 1 work donkey, 6 work oxen, 2 Guernsey bulls, 16 cows, 14 heifers, 6 young bulls, 9 sheep, 55 hens, 125 pullets, 200 chicks, 3 roosters, and of animals used in cooperative improvement breeding,

1 Morgan stallion, 3 bulls, 2 boars, and 2 rams. The offspring sired numbered 6 for the stallion, 16 for the bulls, 57 for the boars, and 6 for the rams.

POULTRY

BREEDING

A cockerel and 15 hens, somewhat typical of small Light Brahmas with, perhaps, more dark feathers, were selected for breeding in experiments begun to compare the merits of three lots of native chickens of mixed breeds. For comparison in egg and meat production ability and in constitutional vigor, 20 hens showing typical characteristics of the Single Comb White Leghorn were mated with purebred White Leghorn cockerels, and 20 hens typical of Rhode Island Reds were mated with purebred Rhode Island Reds.

HATCHING

In March, 1932, 213 chicks, or about 58 per cent, were artificially hatched from 365 eggs. In April, 113 chicks, or about 50 per cent, were artificially hatched from 227 eggs. The first group did remarkably well, but only about 70 per cent of the second group lived as long as two months. In May, 110 chicks, or 63 per cent, were artificially hatched from 175 eggs. From 130 eggs, 91 chicks or an average of 70 per cent, were naturally hatched.

FEEDING

Commercial mash feeds, when supplemented by home-grown native scratch feeds of corn and grain sorghums, made suitable, economical rations for poultry. Hens that were fed egg-laying mash noticeably increased in egg production.

PARASITES AND DISEASES

Station hens affected with scaly legs were treated with equal parts of kerosene and lubricating oil. A study was made to determine the best method for controlling lice and mites on poultry. A light form of chicken pox attacked the station flock of pullets in June.

PARASITES AFFECTING DOMESTIC ANIMALS

The work with parasites was enlarged to include all classes of parasites affecting domestic animals on St. Croix. H. L. Van Volkenburg, parasitologist of the Puerto Rico Agricultural Experiment Station, Mayaguez, who visited the station in February, examined the animals of the islands and found the horses and mules to be affected by nematodes, *Habronema muscae*, *Ascaris equorum*, *Strongylus vulgaris* and other *Strongylus* spp., *Trichonema* or *Cylicostomum* spp., *Oxyuris equi*, *Setaria equina*, and *Onchocerca cervicalis*, and also by tapeworm (*Anoplocephala perfoliata*); the cattle by nematodes, *Haemonchus contortus*, *Bunostomum phlebotomum*, *Oesophagostomum radiatum*, and *Dictyocaulus viviparus*, and trematodes, *Fasciola hepatica;* the sheep and goats by nematodes, *Haemonchus contortus* (and probably other stomach worms), *Bunostomum trigonocephalum*, *Oesophagostomum columbianum*, *Trichostrongylus colubriformis*, and *Trichuris ovis*, and cestodes, *Moniezia expansa* and *Cysticercus tenuicollis;* the swine by nematodes, *Crassisoma urosubulatum* and *Stephanurus dentatus;* and the dogs by nematodes, *Toxocara canis* and *Ancylostoma caninum*.

The use of a solution of 1 per cent copper sulphate and 0.75 per cent nicotine sulphate continued to give good results in the control of stomach worms in station calves. Chloroform was used for lungworm control, 6 drops being placed in each nostril. Later the animals were exposed to tar fumes for 20 to 30 minutes in a closed room. They were well fed with cut grass from a rack. All but one affected calf recovered.

A flock of nearly 600 sheep was treated three times at 2-week intervals with the copper sulphate-nicotine solution for severe infestation with stomach worms, tapeworms, hookworms, and nodular worms. A lamb from an estate on which many sheep had died of stomach-worm and tapeworm infestation was treated with the copper sulphate-nicotine solution at intervals of two to three weeks from January to April, 1932, when it was in good flesh and health. Autopsy showed the presence of a number of nodular worms. Worm-infested goats also were treated with the solution.

Horses and mules were heavily infested with various kinds of worms during the first half of the year when the rains were favorable for worm development.

AILMENTS OF HORSES, MULES, AND CATTLE

Horses and mules continued to suffer from a form of colic and from obstipation, especially during the rainy season. Nearly 15 per cent of the affected animals died. Autopsies revealed that many horses and mules had aneurysms of the mesenteric arteries and that one mule had aneurysm of the exterior iliac artery. All the aneurysms contained thrombi and larvae (*Strongylus vulgaris*).

Adult cattle on the western half of St. Croix again suffered from weakness and anemia, especially during the dry season. The trouble is thought to have been due to a mineral deficiency in the pasture grasses in the region. One affected young cow whose hemoglobin content on the Tallquist scale was only 30 per cent showed a gain of 40 per cent after two and one-half months on good guinea grass supplemented with a balanced dairy ration containing salt, an iron and copper mixture, and bone meal.

MISCELLANEOUS ACTIVITIES

Various activities with the station herd included the treatment of oxen, mules, horses, donkeys, cows, and heifers for minor complaints, for tetanus, and for difficult parturition; also the inspection of animals introduced from Tortola, from St. Kitts, and from Puerto Rico, and of cattle, sheep, and goat hides. Certificates for animals for sale, showing that the quarantine regulations had been complied with, were issued.

REPORT OF THE ASSOCIATE ANIMAL HUSBANDMAN AND DAIRYMAN

By N. N. Nichols

DAIRY CATTLE

Breeding to increase milk production in the station's native dairy herd was continued. Some of the grade Guernsey heifers and grade Shorthorn heifers give promise of becoming fair milkers if they are properly fed and handled.

MILK AND BUTTERFAT PRODUCTION

Milk and butterfat production records of native and grade dairy cows have been kept at the station since 1922. Tests for butterfat have been made at irregular intervals since 1925, and once each month since July, 1928. Each cow in the herd has been milked twice daily without the calf, and the cows have subsisted on guinea grass supplemented occasionally with such soiling crops as sorghums, elephant grass, and sugarcane tops. The cows made substantial gains in milk production during May and June, 1932, when, in addition to pasture, they received a dairy feed containing 20 per cent of protein. They also began to gain in weight and appeared to increase in vigor and in vitality. Table 2 gives the milk and butterfat production of 15 cows for the year ended June 30, 1932.

TABLE 2.—*Comparison of milk and butter yields of 15 cows for the year ended June 30, 1932*

Cow	Lactation period	Average length of time in milk	Average total milk yield	Highest monthly yield of milk	Highest monthly yield of butterfat
		Days	*Pounds*	*Pounds*	*Pounds*
Cherry (native)	Third	357	2,786.1	514.0	21.58
Alma (native)	Fourth	473	5,026.1	721.0	37.91
Mary (native)	Fifth	489	4,089.4	675.2	27.03
Blossom (native)	Sixth	405	4,385.3	758.5	36.40
Berry (Holstein × native)	Sixth	337	3,477.0	658.4	28.28
Ellen (Guernsey)	Fifth	322	2,430.2	454.4	19.94
May (Guernsey)	Second	383	2,050.4	407.8	13.04
Lassie (Shorthorn × native)	First	457	3,335.9	569.2	25.82
Min (Shorthorn × native)	Second	286	2,875.6	372.8	17.09
Spot (Shorthorn × native)	First	457	2,837.9	522.5	19.26
Bonnie (Shorthorn × native)	First	487	4,565.2	646.9	30.40
Tiny (Guernsey × native)	First	325	4,370.9	620.8	24.98
Gladys (Shorthorn × native)				401.2	19.51
Winkie (Shorthorn × native)				337.7	18.05
Olivia (Shorthorn × native)				574.1	22.62

FEEDING TESTS

When harvested in the green and succulent stage and run through a cutter, sorghum, Sudan grass, elephant grass, and guinea grass furnished desirable and nutritious feed for dairy cattle. The cattle consumed practically all the cut feed, only the leaves of the same kinds of forage fed uncut, and 50 per cent of finely chopped mature sorghum and Sudan grass. Some poisoning occurred during a short interval when mature sorghum was fed. There was no further trouble when the feeding was discontinued immediately. During two months the feeding of restricted quantities of a good grade of feed, furnishing 20 per cent of protein and a small amount of bone meal, increased milk yields by 31.7 and 30.5 per cent, respectively, over the yields in a previous month when the cattle had subsisted on native pastures and some sorghums.

CALVES

Twenty-four hours after birth, calves were separated from their mothers and for the first two months were hand fed at the rate of 1 pound of milk to 8 to 10 pounds of body weight. The ratio of feeding

was changed with the age and the size of the calves, none of which was given more than 15 pounds daily.

From November, 1926, to June 30, 1932, 56 calves averaging 59.9 pounds in weight were dropped by the station herd. Thirteen, averaging 60.5 pounds, were dropped during 1932. The birth weights of the male calves averaged 65.4 pounds, and those of the female calves, 54.5 pounds. The heaviest 6-month-old calf, a grade Shorthorn bull, Dictator, weighing 340 pounds, has gained 258 pounds since birth. Another 6-month-old calf, a grade Shorthorn bull, Prince, weighing 331 pounds, has gained 261 pounds since birth.

DAIRYING

During the year cooperative work with the Christiansted Cooperative Dairy was begun. Five dairymen agreed to pool their milk in order to further the project. The employees of the dairy were taught how to test milk and cream for butterfat, make butter, keep business records and audit books, and operate the plant under sanitary conditions. The associate animal husbandman and dairyman visited dairy farms to give advice on improving the quality of the milk, increasing the butterfat content, and remedying insanitary dairy conditions. Dairy equipment was installed at the station to further the development of dairying in the Virgin Islands.

MILK GOATS

In January, 1932, some native does were purchased to establish a goat herd at the station.

MISCELLANEOUS

During the year demonstrations in proper methods of producing milk for local consumption and for manufacturing purposes were given. Many persons visited the station dairy to familiarize themselves with proper methods of feeding and handling dairy cattle and to see milk produced under modern methods. The dairy herd register was revised and new photographs of all the cattle were taken.

REPORT OF THE AGRICULTURIST FOR ST. THOMAS AND ST. JOHN

By W. M. Perry

MUNICIPAL NURSERY

The experimental plantings in the municipal nursery of about 2½ acres on St. Thomas were operated under the direction of the agriculturist. Hardwoods, ornamentals, fruits, and other economic plants were grown, and over 9,000 sweetpotato cuttings and 3,276 plants of various kinds were distributed. Part of the nursery was used for growing in quarantine introduced varieties of sugarcane intended for shipment to the station on St. Croix.

MISCELLANEOUS PLANTINGS

Miscellaneous plantings under observation included silk cotton or pochote, Easter lilies, and roselle (*Hibiscus sabdariffa*), sea-island cotton, tomatoes, peppers, onions, bougainvilleas, oleanders, frangipani, the silk-oak tree (*Grevillea robusta*), star-gooseberry (*Phyllanthus acidus*), limes and lemons, figs, and pigeon peas.

The Hawaii papayas continued to prove their superiority over the native kinds. The former have thicker flesh, are no more subject to attack by devastating insects than are the native papayas, and bear as early as do the latter.

PRESERVATION OF NATIVE FRUITS

Experimental canning of the native soursop (*Annona muricata*) was continued. The fruit cans well. Experiments to make a mango chutney appealing to the American taste resulted in an excellent product for which a market is being sought. A jelly of slightly currant flavor was made by combining the Otaheite or native star-gooseberry, with papaya. Papaya flavored with lime and with ginger made a conserve that should command a ready sale on the northern markets of the United States.

INTRODUCTION OF PUREBREDS

Purebred animals introduced during the year included 1 Holstein bull, 1 Duroc-Jersey boar, 1 Hampshire and 1 Corriedale ram, 1 Saanan buck (goat), and 12 Single Comb White Leghorn hens and 2 cockerels.

MISCELLANEOUS ACTIVITIES

The agriculturist assisted in planning school gardens, served as a member of the beautification committee of the islands, supervised the dipping of cattle, issued certificates for many of the animals dipped, and inspected some animals introduced from Tortola. Approximately 730 persons called at the extension office for advice on agricultural matters. The agriculturist gave as much time as possible to the development of the local livestock industry.

REPORT OF THE SPECIALIST IN HOME ECONOMICS

By Helen L. Cawley

The specialist in home economics made nutritional studies with adults through home-demonstration clubs and with native nurses in the municipal hospitals on St. Croix, and with children through the school lunch; organized adult-demonstration clubs and boys' and girls' 4-H clubs and taught sanitation to the members; endeavored to improve living conditions among the natives; used native fruits in making jellies, preserves, and marmalades; and did experimental canning with vegetables grown at the station.

Lunches were again served in various schools, and lunchrooms were provided in additional schools on St. Croix and on St. Thomas. On St. Croix the school lunches were under the direct supervision of the specialist in home economics. Eighty girls were directed in preparing, cooking, and serving school lunches and in the care of the kitchen.

Two home-demonstration clubs were organized in the Virgin Islands, and an extensive program was carried on at Christiansted. Demonstrations in making guava-and-lime jelly, tamarind butter, and gooseberry preserves, and in preparing soups, vegetables, meats, and quick breads and beverages were given.

The Jerusalem Club remodeled a cottage in which to hold club meetings, and gave several demonstrations in cooking and in sewing.

On St. John four groups of women were taught methods of preparing various home-grown vegetables.

A 2-week course in home economics was given in the summer school on St. Thomas.

Boys' and girls' 4-H clubs were organized in four rural schools, and the club activities supervised included sewing, cooking, tree planting, flower gardening, basketry, painting and carpentering, housework, mongoose control, and work with calves, pigs, poultry, goats, corn, gardens, yams and tania, and fruit and sugarcane.

FORESTRY SURVEY IN THE VIRGIN ISLANDS

By E. V. Roberts, *Associate Forester, United States Forest Service*

The experimental work of the Forest Service and of private landowners in the islands has demonstrated the impracticability of attempting to reforest the bush areas with valuable forest trees. The cost involved, together with the uncertainty of ultimate returns, makes the proposition extremely precarious. Moreover, there is no urgent need for the reforestation of these lands. The bush growth furnishes adequate protection against soil erosion and rapid run-off, the existing timber supply is sufficient for local needs, and transportation problems preclude the possibility of developing export markets for any but the most valuable products. There is little opportunity of replacing the imported pine lumber with native woods for construction, as the local hardwoods are not suitable for this purpose, nor are there milling facilities.

Figure 7.—Recently stripped bay trees

On St. Thomas the forestry possibilities are confined to the development of small groves of mahogany on the better sites where labor costs may be kept at a minimum, and where the possibility of hurricane damage is least. A demand for forest trees for roadside, fencerow, and house-lot planting, chiefly for their aesthetic value, will continue. This type of planting should be encouraged. The pastures

of St. Thomas are fairly well provided with shade so that there is no need to urge this type of planting here as there is on St. Croix. St. Thomas does not have such extensive agricultural lands as does St. Croix, so windbreaks are not so essential, though they should be recommended for garden crops on exposed sites.

On St. Croix there is an active need for windbreaks across the low southwestern part of the island to lessen the effect of the constant trade winds, particularly on those areas where garden crops are to be raised. The experimental and demonstrational work along these lines should be continued, with emphasis on the use of native trees instead of exotics. Shade trees are needed on the extensive cleared pastures. There will be a continued demand for small quantities of seedlings for roadside and house-lot planting, which should be encouraged and expanded.

On St. John there is little need for planting forest trees, since the island is fairly well covered with a second-growth stand. Improving natural stands by systematic thinning in connection with charcoal production would result in the development of timber trees of good quality, but there is little incentive to such action as long as charcoal continues to be the only forest product for which there is a constant demand. The bay-oil industry could readily be expanded without an increase in the area devoted to bay trees if the method of stripping the leaves from the tree were refined.

METEOROLOGICAL OBSERVATIONS

By A. Bisserup

Rainfall at the experiment station on St. Croix for the fiscal year ended June 30, 1932, measured 68.7 inches, or about 26 inches above the average of the five preceding years. The absolute maximum temperature was 92° F., recorded June 7, and the absolute minimum temperature, 57°, recorded February 21 and February 23. Table 3 gives a summary of the meteorological data for the year.

Table 3.—*Condensed meteorological data for the experiment station on St. Croix for the year ended June 30, 1932*

Year and month	Temperature		Total rainfall	Average daily velocity of wind	Monthly evaporation
	Maximum	Minimum			
1931	°F.	°F.	Inches	Miles	Inches
July	88.2	72.1	5.14	40.5	6.838
August	88.1	74.3	4.86	41.8	6.125
September	86.9	70.5	9.96	23.5	4.918
October	87.8	71.3	13.08	8.4	4.666
November	87.2	70.3	12.11	12.2	3.770
December	84.8	68.5	1.90	44.4	4.262
1932					
January	83.0	66.4	3.81	50.6	5.210
February	82.9	63.9	1.92	42.8	5.455
March	84.6	64.7	1.17	42.2	6.777
April	85.0	68.9	1.91	50.3	6.607
May	84.4	71.8	9.60	44.3	6.260
June	88.0	72.9	3.23	48.0	6.692
Total			68.69		67.580

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